

Claims

[1] A conductive thermoplastic-resin film which comprises a mixture of a thermoplastic resin and a conductive material and has a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10\ \Omega\cdot\text{cm}$ or lower and a moisture permeability, as measured at a film thickness of $100\ \mu\text{m}$ by JIS K-7129 method B in an atmosphere of 40°C and a relative humidity (RH) of 90%, of $10\ \text{g}/(\text{m}^2\cdot 24\ \text{hr})$ or lower.

[2] The conductive thermoplastic-resin film according to claim 1, wherein the conductive material contained in the conductive thermoplastic-resin film A comprises: a graphite powder which has an average particle diameter of from $1\ \mu\text{m}$ to $20\ \mu\text{m}$ and in which particles having a particle diameter of $40\ \mu\text{m}$ or smaller account for 80% by mass or more of the whole powder; and a carbon black powder.

[3] The conductive thermoplastic-resin film according to claim 1 or 2, wherein the volume filling factor A of the carbon black powder and the volume filling factor B of the graphite powder in the conductive material contained in the conductive thermoplastic-resin film A are in the ranges represented by the following expressions:

$$0 < A \leq 0.4 \times (1-B)$$

$$0 < B \leq 0.5$$

$$A + B = 1$$

[4] A conductive thermoplastic-resin film which comprises a mixture of a thermoplastic resin and a conductive material and has a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10 \Omega \cdot \text{cm}$ or lower and a peel strength in the range of 1-150 N as measured at 25°C after disposing two sheets of the film ($150 \text{ mm} \times 25 \text{ mm}$) so as to face each other and laminating the sheets to each other by pressing these in an atmosphere of 25°C at a pressure of $3.9 \times 10^5 \text{ Pa}$ for 1 minute.

[5] The conductive thermoplastic-resin film according to claim 4, wherein that the conductive thermoplastic-resin film B contains an amorphous propylene/butene copolymer or an amorphous propylene/ethylene/butene copolymer in an amount in the range of 30-65% by mass.

[6] A conductive thermoplastic-resin laminate film which comprises: a conductive thermoplastic-resin film A, as a base, which comprises a mixture of a thermoplastic resin and a conductive material and having a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10 \Omega \cdot \text{cm}$

or lower and a moisture permeability, as measured at a film thickness of 100 μm by JIS K-7129 method B in an atmosphere of 40°C and a relative humidity (RH) of 90%, of 10 g/(m²·24 hr) or lower; and a conductive thermoplastic-resin film B having the following tackiness characteristics which has been laminated to at least one side of the film base:

Tackiness characteristics:

the peel strength as measured at 25°C after disposing two sheets of the film (150 mm × 25 mm) so as to face each other and laminating the sheets to each other by pressing these in an atmosphere of 25°C at a pressure of 3.9×10^5 Pa for 1 minute is in the range of 1-150 N.

[7] The conductive thermoplastic-resin film or conductive thermoplastic-resin laminate film according to any one of claims 1 to 6, characterized by being used as a current collector for an electric double-layer capacitor and as a current collector for a proton-ion polymer battery.